

Patterns of paging medical interns during night calls at two teaching hospitals

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Objective: To assess the patterns of paging medical interns during night calls.

Design: Descriptive study; diaries were used to log calls between 7 pm and 7 am for 1 week in February 1991.

Setting: Two teaching hospitals in Halifax.

Participants: All 10 interns assigned to the 15 medical units and nurses from 3 representative medical units.

Main outcome measures: Number and nature of calls.

Results: The overall response rate was 90%. A total of 309 calls were logged by the interns and 107 by the nurses. Each intern had 17 calls on average (range 6 to 33) per 12-hour period. Of the calls 27% occurred after midnight, 25% disrupted sleeping, and 19% interrupted direct patient contact. Overall, the most common reasons for paging interns were related to prescribing of medications (42% of the calls), direct patient assessment (25%) and reporting of laboratory results (18%). According to the nurses, there were no delays in the interns' responding to the pages, and 61% of the calls led to a new physician order.

Conclusions: Paging frequently interrupts interns during work and rest on night calls. Assessment of paging patterns may be useful in identifying specific interventions to reduce the number of calls so that interns will have fewer interruptions during patient encounters and more rest. The collection of data from nurses in a routine nursing audit may be useful for evaluating the communication between interns and nurses and, indirectly, for assessing interns' workload.

Objectif : Évaluer les tendances des appels destinés aux internes en médecine au cours de la nuit.

Conception : Étude descriptive; on a utilisé des agendas pour inscrire les appels entre 19 h et 7 h pendant une semaine en février 1991.

Contexte : Deux hôpitaux d'enseignement de Halifax.

Participants : Les 10 internes affectés aux 15 services de médecine et des infirmières de 3 services de médecine représentatifs.

Principales mesures de résultats : Nombre et nature des appels.

Résultats : Le taux de réponse global s'est établi à 90 %. Au total, les internes ont enregistré 309 appels et les infirmières, 107. Chaque interne a reçu en moyenne 17 appels (écart de 6 à

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The views expressed in this article are those of the authors and not necessarily those of PARI-MP.

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33) par période de 12 heures : 27 % ont eu lieu après minuit, 25 % ont interrompu le sommeil des intéressés et 19 % ont interrompu un contact direct avec un patient. Dans l'ensemble, les raisons les plus fréquentes des appels aux internes étaient liés à l'ordonnance de médicaments (42 % des appels), à l'examen direct d'un patient (25 %) et à la communication de résultats d'examen de laboratoire (18 %). Selon les infirmières, les internes n'ont pas tardé à répondre aux appels et 61 % de ces appels ont entraîné l'établissement d'une nouvelle ordonnance par le médecin.

Conclusions : Les appels interrompent souvent les internes au travail et durant leurs périodes de repos la nuit. L'évaluation des tendances des appels pourrait aider à trouver des moyens de réduire le nombre des appels afin que les internes soient interrompus moins souvent pendant leurs contacts avec les patients et puissent prendre davantage de repos. La collecte de données auprès des infirmières au cours d'une vérification infirmière de routine pourrait aider à évaluer la communication entre les internes et les infirmières et, indirectement, la charge de travail des internes.

Internship is physically and emotionally demanding.^{1,2} The average work week ranges from 80 to 110 hours, and of this as much as 36 to 48 hours are spent on call. After completion of a regular 9-hour work day, the intern remains in hospital for 15 hours on call for the night and then works another 9 or 10 hours. This translates into 34 hours of consecutive duty in the hospital.

At night formal teaching and direct supervision are sporadic.³ Hence, for the intern the main purpose of being on call at night is to provide emergent care to inpatients. However, many other procedural, clerical and situational tasks are performed.^{4,5} Such "scutwork"⁶ includes doing write-ups for elective admissions to other medical services after 5 pm, clarifying and renewing other physicians' orders, and inserting or replacing intravenous cannulas for administration of fluids, blood products and medications.

Excessive workload and sleep deprivation cause high stress levels and fatigue during internship.⁷ Paging devices have been cited to contribute to this stress;⁸ in addition, they allow no specific breaks for sleeping, eating or attending to personal hygiene. Reducing the number of unnecessary pages and postponing nonurgent ones could result in significantly fewer disruptions of patient care and allow more rest for interns.⁹

The purpose of this study was to describe the patterns of paging medical interns during night calls at two teaching hospitals in Halifax affiliated with Dalhousie University: the Victoria General Hospital (VGH) and the Halifax Infirmary site (HI) of the Camp Hill Medical Centre.

Methods

Setting

The VGH is an 800-bed hospital that provides mainly tertiary care; 250 active-care beds are designated for internal medicine. It is a major referral centre for New Brunswick, Nova Scotia and Prince Edward Island. The medical wards are divided into 12 nursing units. The medical teams are oriented toward subspecialties. Two interns are on call every night, and each intern is on call every third or fourth night.

HI is a 300-bed hospital, with 100 beds designated for internal medicine. It serves the city and county of Halifax. The main medical wards are divided into three nursing units. One intern is on call every night, and each intern is on call every third night.

Night calls at the two hospitals last 15 hours and start at 5 pm. This period is preceded and followed by a regular day of work. Interns are the first ones to be called for any problem related to inpatients. In the VGH and the HI, unlike many other hospitals, interns neither assess patients in the emergency department nor do the write-up for admitting them to the hospital; this function is the duty of the residents on night call.

The paging devices at the two hospitals display numeric messages. Members of the code team also carry voice-activated paging devices. Interns maintain telephone contact with residents and attending physicians concerning admissions, transfers and patients in unstable condition. Laboratory results are usually relayed to the nursing units rather than directly to the intern on night call. Hence, most pages during night calls at the two hospitals originate from the nursing units.

Data collection

In February 1991 we asked all 10 interns assigned to the medical teams at the VGH and the HI to keep diaries of pages received each night from 7 pm to 7 am over a 1-week period. This interval corresponded to the 12-hour night shift for nurses. Every time the interns were paged they were to record the time, the nursing unit from which the call originated, the reason for the page, the action taken and a description of what they were doing at the time of the page.

We also asked the nursing staff of three nursing units (two at the VGH and one at the HI) to keep diaries of all pages made to the interns on call for the same 12-hour periods. These units were considered representative of the 15 medical nursing units. The data collected included the time when the page was initiated, the reason for the page, the response time and the actions taken by the intern on call. These actions were classified into three categories: no action, new physician order or visit

to the nursing unit. Since the aim of the study was to describe the paging patterns in the context of workload, no attempt was made to assess the urgency or need for paging.

All participating interns and nurses were aware of the study design. We felt that the data collected by interns and nurses would permit a more balanced assessment of intern paging patterns. Furthermore, it would allow an assessment of the accuracy of interns' self-reported diaries. The data-collection sheets for the nursing units were prepared by the nursing offices of each hospital and carried out in the form of a nursing audit. Audits are routinely conducted by nurses for assessment of their workload, patient care, utilization review and quality assurance.

Statistical analysis

We used the Mann-Whitney procedure and the χ^2 test to check for differences in data between the two hospitals. To measure the degree of agreement between the data collected by the interns and those collected by the nurses we applied the kappa (κ) statistic of Cohen¹⁰ using SPSS software (SPSS/PC+ Studentware Plus; SPSS Inc., Chicago, 1991). Only *p* values of less than 0.05 were considered significant.

Results

The 10 interns completed 18 (86%) of the 21 diaries expected. The nurses in the three nursing units completed 20 (95%) of the 21 diaries expected. One intern at the VGH did not complete her diary for one night because she was too busy. The other diaries were missing either because of accidental misplacement or damage. Of the pages recorded by the interns 35% originated from the three nursing units participating in the study.

The data from the two hospitals are presented in

Table 1; no statistically significant difference could be detected. During each 12-hour period a mean number of 17 (range 6 to 33) calls were received per intern. About one third of the calls occurred after midnight. On average, each intern was paged 1.4 times per hour.

According to the interns' and nurses' diaries, prescribing medications was the most frequent reason for paging (Table 2). Often, the medications prescribed were hypnotic drugs, non-narcotic analgesics, laxatives or stool softeners. Less often, the treatments ordered included adjustments in the rate of intravenous heparin or theophylline drips and in the dosage of insulin, potassium supplements or warfarin. One quarter of the calls were for assessments of patients with complaints or changes in vital signs.

According to the nurses, there were no delays in the interns' responding to the pages. Table 3 illustrates the interns' actions in response to the calls, as reported by

Table 2: Reasons for paging the interns

Reason	Source;* no. (and %) of calls	
	Interns' diaries	Nurses' diaries
Prescribing of medication	138 (45)	38 (36)
Patient assessment	75 (24)	27 (25)
Reporting of laboratory results	51 (17)	22 (21)
Starting of intravenous line or venipuncture	25 (8)	15 (14)
Death pronouncement	4 (1)	—
Resuscitation	2 (1)	—
Wrong number	2 (1)	—
Not recorded	12 (4)	5 (5)
Total	309	107

*There were 18 diaries completed by interns and 20 diaries by nurses (from three representative nursing units).

Table 1: Pattern of paging medical interns during 1 week in two teaching hospitals in Halifax*

Variable	Victoria General Hospital	Halifax Infirmary
No. (and %) of calls during the study period		
From 7 pm to 12 am	181 (74)	46 (71)
From 12 am to 7 am	63 (26)	19 (29)
Total	244	65
No. (and %) of diaries completed†	12 (86)	6 (86)
No. of interns on call per night	2	1
Mean no. (and range) of calls per night per intern‡	20 (9–33)	11 (6–14)

*Only the interns' diaries were used as the source of information.
†Seven interns in the Victoria General Hospital were asked to complete 14 diaries, and three in the Halifax Infirmary were asked to complete 7 diaries.
‡No significant difference between the two hospitals.

the interns and the nurses. Almost two thirds of the calls resulted in new physician orders. The interns and nurses reported that 18% and 11% of the calls respectively resulted in no action.

Of the calls 19% interrupted direct patient encounter. In one case, an intern was interrupted six times during the assessment of a patient who had just been transferred from another hospital. Twenty-five percent of the calls disrupted sleeping. In addition, the calls interrupted interns' direct and telephone communication with nursing, pharmacy and laboratory staff regarding patients' conditions, medications and test results. Recreation and reading constituted only 5% of the activities interrupted by the pages.

After completing the data collection and preliminary analysis, we considered the potential for using the nurses' data, collected in the form of routine nursing audits, to estimate indirectly the interns' workload. We compared the concordance between the interns' and nurses' data recording. Two calls recorded in the interns' diaries were not recorded in the nurses' diaries. Four calls recorded in the nurses' diaries were missing from the interns' diaries. There was strong agreement between the nurses' and the interns' descriptions of the reasons for paging the interns (κ value 0.82; $p < 0.0001$). Likewise, there was strong agreement between their recordings regarding responses of the interns to the pages (κ value 0.62; $p < 0.0001$).

Discussion

Studies of house-staff workload have been conducted with the use of time-based observations,^{4,11} self-reported diaries during call periods^{5,6,9} and post-call surveys.^{2,3} In this study we used self-reported diaries but supplemented them with collateral data from nurses collected as part of a routine nursing audit. In previous studies^{5,9} the accuracy of self-reported diaries by interns

was not scrutinized. Our study design allowed us to assess the concordance of data recorded by the interns and the nurses.

Although the interns participating in our study were highly motivated, we think the concurrent collection of data by nurses may have improved the thoroughness of data recording by the interns. The paging patterns recorded in the nurses' diaries correlated very well with the patterns in the interns' diaries. This suggests that nursing audits may be used to evaluate the communication between nurses and house staff, to identify problems such as delays in interns' responding or excessive calls for routine matters and to assess indirectly house-staff workload.

The interns' and nurses' awareness of the study design may have led to bias because of an observation effect. The interns' response times, for example, may have been faster than usual. More important, the frequency with which the interns were paged may have been lower than usual; this suggests that our estimates are conservative. Only one intern was unable to complete the data sheet because she was too busy. Despite these limitations the frequency with which the medical interns were paged was within the 11 to 25 calls per night reported from similar studies.^{4,9}

Unlike in other studies we did not classify the pages according to urgency and need. These are subjective and situational, as shown previously.⁶ Instead, calls were classified by the interns' responses. We felt that a classification based on action taken gave a better estimate for workload. These type of data may still be used to improve the communication between interns and nurses. In fact, one study suggested joint, case-oriented conferences to address appropriate indications for paging house staff to improve communication and decision making regarding patient care.⁹

Studies have shown that house staff on night call spend little time on direct patient care or educational activities.^{4,5,11} In our study we noted that the patient-physician encounters were frequently disrupted. Sleep deprivation has also been cited as an important factor causing fatigue during internship.⁷ In our study almost one third of the calls occurred after midnight, and one quarter interrupted the interns' sleep.

Our review of the reasons for paging allowed us to identify specific ways to reduce the number of calls. The proposed strategies include (a) weekly daytime review and reordering of all medications, (b) consideration of routine orders for insomnia and constipation at the time of admission for all patients in each nursing unit, (c) encouragement of interns to visit regularly all nursing units before midnight to reduce the number of calls after midnight and (d) use of anticoagulation protocols. Besides decreasing the number of calls, anticoagulation protocols improve patient care by avoiding delays in achieving and maintaining adequate anticoagulation.¹²

Other proposed strategies are directed to the hospi-

Table 3: Action taken by the interns in response to the pages

Action	Source; no. (and %) of calls	
	Interns' diaries	Nurses' diaries
New physician order	159 (51)	51 (48)
Visit to nursing unit resulting in no new physician order	49 (16)	22 (21)
Visit to nursing unit resulting in new physician order	36 (12)	14 (13)
No action	57 (18)	12 (11)
Not recorded	8 (3)	8 (7)
Total	309	107

tals: (a) availability of more personnel certified to perform venipuncture, to start intravenous cannulas and to administer intravenous medications and (b) extension of the hours for routine daytime services (e.g., electrocardiography by technicians) beyond 5 pm.

A particular situation was identified in the nursing units that have adopted total patient care (each nurse exclusively cares for a certain number of patients). Although this approach individualizes patient care and allows nurses to provide psychosocial as well as medical interventions, it sometimes results in many calls, every few minutes, from several nurses on one unit to the same intern. This could be remedied if all the problems requiring paging of the intern were pooled.

The current health care system puts excessive demands on interns. This is mainly due to more severe illnesses necessitating greater hour-to-hour attention, shorter patient stays, more demanding medical technology and more complex therapies.¹³ The cuts in the number of postgraduate training positions and the increased workload has led postgraduate training programs to evaluate the balance between service and education.^{14,15} One potential area to reduce intern workload and improve the balance between service and education is during night calls.¹⁶ Our describing the pattern of paging medical interns at night allowed us to identify specific strategies to reduce the number of calls, which may result in fewer disruptions of patient care and more rest for the interns. Evaluation of interventions in this area is an important area for further study.

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